

OPERATIONAL OVERREACH OR ACADEMIC UNDER REACH: PREVENTING CULMINATION THROUGH SUSTAINMENT

A Monograph

by

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ABSTRACT

OPERATIONAL OVERREACH OR ACADEMIC UNDER REACH; PREVENTING CULMINATION THROUGH SUSTAINMENT by MAJ Stephen Magner, 43 pages.

General Dwight D. Eisenhower's, Chief of Staff, Supreme Headquarters Allied Expeditionary Forces, Lieutenant General Bedell Smith, wrote in *Eisenhower's Six Great Decisions* that "it is no great matter to change tactical plans in a hurry and send troops off in new directions. But adjusting supply plans to the altered tactical scheme is far more difficult." These words still hold true today. During the invasion of Iraq in 2003, US supply lines extended over three hundred miles from Kuwait into Iraq. Similarly, between August 1944 and September 1944, Lieutenant General George Patton extended his supply lines over three hundred miles in his pursuit of German forces across Europe. The difference between the two is that one operation was able to maintain its operational reach while the other culminated.

Operational reach and culmination are separated by a fine line and are both necessary considerations when planning and executing operations. James Huston wrote that logistics culmination and operational logistics pauses are a common event in the US war experience. Current US Army sustainment doctrine, ADRP 4-0 warns that sustainment failure can cause an unanticipated pause or worse, a culmination of an operation resulting in a loss of initiative. This makes it critical that the Commander is able to consider when, where, and who to pause during operations.

The research determines if current US Army sustainment doctrine and sustainment curriculum are mutually supporting in such a way that enables sustainment planners to maintain operational reach and prevent culmination. Vital to determining this is the assessment of two things. First, does current sustainment curriculum capture the concept and requirement of operational reach as articulated in current Army doctrine. Second, does current sustainment curriculum produce sustainers that are capable of balancing the art and science of sustainment?

The answer depends on several factors: the examination of current Army sustainment doctrine, to include defining key terms and the examination three case studies. The studies examine V Corps attack into Baghdad, Iraq in 2003, General Patton's pursuit of the German forces from August through September 1944, and finally the Red Ball Express as a response to culmination in 1944. The case studies exemplify successful and unsuccessful operations relevant to operational reach, as well as the second and third order effects associated with culmination. Finally, current sustainment curriculum and sustainment doctrine will be assessed to determine if they are mutually supporting in such a way that enables the sustainment planner to contribute in a holistic approach to maintain operational reach.

Research indicated that Lieutenant General Patton culminated largely due to General Eisenhower's failure to make a decision to conduct an operational pause during the Allied pursuit of the Germans in August through September 1944. Research also indicated that during the Iraq invasion in 2003, Lieutenant General William Wallace maintained his operational reach by making a clear decision to conduct an operational pause prior to his attack into Baghdad. Both cases highlight the requirement for the commander to decide when it is necessary to conduct an operational pause. Failure to determine when an operational pause is required will not only force culmination but also unintended reactions as demonstrated by a case study of the Red Ball Express. Findings demonstrated that current sustainment curriculum does not nest with current sustainment doctrine and generally drives a mechanistic focus on tables, consumption rates, and calculations. As a result a planning gap is overlooked. In essence science is being applied without art. Fortunately, there are opportunities in the Captains and Majors sustainment curriculum to correct this gap.

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INTRODUCTION

During World War II, Lieutenant General George Patton's Third Army culminated in September 1944. Third Armies operational tempo outpaced their logistical reach causing their campaign to transition unintentionally. During Operation Iraqi Freedom, V Corps conducted an operational pause outside of Baghdad to shorten lines of communication (LOC) and consolidate and reorganize its combat power. As a result, V Corps was able to enter Baghdad, resupplied, reorganized, and with shortened LOCs.¹ Both operations had LOCs that extended upwards of 300 miles from unorganized, central supply depots. However, what separates these two examples is the ability to determine operational reach relative to the desired objective. Failure to thoroughly consider operational reach and its associated culmination points will limit the Commander's ability to decide when, where, and who to pause to enable operational reach

ADRP 4-0, Sustainment, echoes the importance of operational reach by defining a successful sustainment war fighting function as a system that ensures freedom of action to extend operational reach. Furthermore, *ADRP 4-0*, states that successful sustainment enables freedom of action and increases the number of options available to the commander. The most important idea in *ADRP 4-0* is the warning that sustainment failure could cause an unanticipated pause or culmination of an operation resulting in loss of the initiative.² Regardless of how well-crafted current sustainment doctrine is, unless it is well nested with curriculum it is irrelevant because sustainment leaders will not be able to apply the doctrine effectively.

¹Headquarters, Department of the Army, *ADP 3-0, Unified Land Operations* (Washington DC: Government Printing Office, 2011), 3, describes lines of communication as the lines that connect multiple entry points into an area of operations to enable Army leaders to project and sustain forces in their operational environment.

²Headquarters, Department of the Army, *ADP 4-0, Sustainment* (Washington DC: Government Printing Office, 2012), 1-1, 1-2, 3-1.

In consideration of *ADRP 4-0, Sustainment*, does current sustainment curriculum for Captains and Majors capture the concept of operational reach, freedom of action, and prolonged endurance codified in doctrine? Are sustainers rooted in the principles of sustainment as they apply to the above? Has sustainment curriculum become caught up in making experts in a field that can produce scientific estimates and calculations but that overlook the art of enabling the commander to visualize decision points associated with operational reach? The purpose of this monograph is to examine current sustainment doctrine and sustainment curriculum of the primary sustainer officer development courses; the Support Operations Officer course and Combined Captains Logistic Career Course to determine their impact on campaign planning regards campaign transition, operational reach, and culmination. An outcome of this examination will provide recommendations to improve the way logisticians apply their craft to enable operational reach to avoid culmination. More importantly by focusing on the idea of sustaining operational reach it will enable sustainment leaders to better anticipate culmination points and better contribute to producing options for command decisions.

In the first section, it is useful to examine current US Army doctrine in relation to sustainment planning. The examination of doctrine will also define key logistics terms and demonstrate the appropriate application of doctrine. Additionally the section uses the principles of sustainment to assess the effective application of sustainment doctrine relative to operational reach during Operation Iraqi Freedom, 2003.

The second section begins with a case study on Third Army's exploitation across Europe in August 1944. General Patton's rapid movement across Europe extended supply lines so explosively that logistical reach was over extended within one month. As a result the tempo was

slowed, a decision to conduct an operational pause was abandoned, and by September 1944 operations had all but ceased due to culmination.³

The third section demonstrates how failure to apply an appropriate sustainment plan in consideration of decision points, relative to operational reach creates second and third order effects. The section uses the Red Ball Express as a case study to articulate the cost of culmination and the significant second and third order effects generated from exceeding operational reach. More importantly it will demonstrate how these effects can be unrecoverable as they generate ripple effects from the tactical to strategic echelon of command.

The fourth section assess whether sustainment curriculum and doctrine are mutually supporting. The section covers in detail two sustainment capstone courses; the Combined Captains Logistic Career Course and the Support Operations Officer course and the impacts each course has on the development of sustainment planning throughout the logistic force. During this discussion the balance between efficiency and effectiveness as well as the mechanic and holistic approach will be used to assess the supporting roles doctrine and curriculum provide each other.

Finally by reviewing US Army doctrine and the principals of sustainment as well as analyzing historical examples from a logistic perspective, recommendations for the future application of sustainment will emerge. The intent of the recommendations is to demonstrate two things. First, the recommendations will demonstrate where the gap is between sustainment curriculum and sustainment doctrine. Second, the recommendation will highlight areas for improvement of logistical planning to extend operational reach, prevent culmination, and enable exploitation and campaign transition thus aligning sustainment curriculum with doctrine.

³U.S. Army, *The Operations*, vol. 1, After Action Report, Third US Army, 1 August 1944-9 May 1945. Volume 1 & 2 reproduced jointly by 652nd Engineering (TOPO) Bn., CO. B, 942nd Engineer AVN., (TOPO) Bn. Ruppenthal, *Command Decisions, Logistics and the Broad-Front Strategy* (Washington, DC: Center of Military History, 1990), 423. Peter Dye, "To What Extent Were Logistics Shortages Responsible for Patton's Culmination on the Meuse in 1944?" *Department of the Air Force Journal of Logistics* (18 October 1999): 1

LOGISTICS, DOCTRINE, AND THE PRINCIPLES OF SUSTAINMENT, OPERATION
IRAQI FREEDOM 2003

They will reach a point where no preparations could possibly have been made, and the stocks collected for the rest of the army are usually too far away.

—Carl Von Clausewitz, *On War*⁴

During the last two weeks of December 1944 lead elements of Lieutenant General George Patton's Third Army were conducting an attack against the failed German penetration of the allied front.⁵ By the end of December three of the five divisions of the XLVII Panzer Corps were immobile due to logistics. The Germans culminated due to three logistical reasons; lack of fuel, inability to transport supplies, and degradation of key lines of communication. On 20 December 1944, for example, the 12th SS Panzer Division, a leading formation in the Sixth Panzer Army advance, was brought to a halt and could not continue operations because there was no fuel. On 21 December 1944, 2d SS Panzer Division was ordered to relieve the 560th Volks Grenadier Division in the battle at Fraiture, Belgium. However the 2d SS Panzer Division was unable to begin movement for a day and a half because of a lack of fuel. Then on 28 December 1944, the Panzer Lehr Division reported a shortage of ammunition because of the lack of transport. Furthermore, German resupply was accomplished over distances that stretched back to the Rhine over ill repaired and routinely bombed roads. On 31 December, 1944 a commander from the German *Panzer Lehr* noted that a supply train he sent to Merlsheid near St. Vith, on 25 December 1944 had not returned.⁶ The German attack culminated well short of its objective,

⁴Carl, Von, Clausewitz, *On War*, edited and translated by Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 334.

⁵Hugh M. Cole, *The United States Army in World War II, The European Theater of Operations, The Ardennes: Battle of the Bulge* (Washington, DC: Office of the Chief of Military History, 1965), 377.

⁶*Ibid.*, 664-667.

German endurance became exhausted, the ability to maintain tempo failed and operational reach constricted.

To understand the idea of operational reach and culmination it is useful to understand several critical terms as they apply to current US Army doctrine. The terms are; sustainment, logistics, operational reach, culmination, tempo, and the eight principles of sustainment. The first concept to understand is sustainment. Sustainment is the war fighting function that relates tasks and systems that provide support and services to extend operational reach and prolong endurance.⁷ A successful sustainment plan is integrated with the operational maneuver plan to prevent culmination or loss of the initiative by managing transitions. Through logistics the sustainment war fighting function executes support and services to the formation. Logistics by definition is planning and executing the movement and support of forces and furnishing of services. The movement and support of the forces is directly related to extending operational reach, otherwise known as the distance and duration which a unit can successfully employ military capabilities.⁸ Once a force can no longer achieve the distance and duration required to employ its military capabilities that force culminates unless it has planned and executed an operational pause. Culmination refers to a point in time and space at which a force no longer possesses the capability to continue its current form of operations. Critical to any sustainment planning is the anticipation of possible culmination points relative to the concept of the operation and desired tempo. Tempo is the speed and rhythm of military operations over time and reflects

⁷Headquarters, Department of the Army, *ADP 4-0, Sustainment* (Washington DC: Government Printing Office, 2012), Glossary-3. Warfighting Functions are defined in ADP 3-0 as a group of tasks and systems (people, organizations, information, and processes) united by a common purpose that commanders use to accomplish missions. The Army's war fighting functions are fundamentally linked to the joint functions.

⁸*Ibid.*, Glossary-2,11.

the rate of military action that must be maintained.⁹ Understanding that sustainment extends operational reach to prevent culmination and enable campaign transition, it must also be understood how important it is to nest the sustainment concept with the concept of the operations. By applying the principles of sustainment to ensure the sustainment concept is nested with the concept of the operation the commander can visualize what potential decisions are required to extend operational reach and prevent culmination.

US Army sustainment doctrine states that the principles of sustainment are essential to enabling operational reach and providing Army forces endurance. Along with anticipating the operational environment, the principles of sustainment articulated in *ADP 4-0, Sustainment*, the July 2012 edition, serve as a well-crafted handrail that enables the anticipation of culmination points and opportunities where exploitation may be achieved. There are eight principles of sustainment. They are; integration, anticipation, responsiveness, simplicity, economy, survivability, continuity, and improvisation.¹⁰

Integration is the combination of all elements of sustainment to operations assuring unity of command and effort. Anticipation is the ability to foresee operational requirements and initiate actions that satisfy a response without waiting for an operations order of fragmentary order. Responsiveness is the ability to react to changing requirements and respond to meet the needs to maintain support, while simplicity relates to processes and procedures to minimize the complexity of sustainment. Economy provides sustainment resources in an efficient manner to enable a commander to employ all assets to achieve the greatest effect possible. Survivability is all aspects of protecting personnel, weapons, and supplies while simultaneously deceiving the enemy. Continuity is the uninterrupted provision of sustainment across all levels of war. Lastly,

⁹Headquarters, Department of the Army, *ADRP 3-0, Unified Land Operations* (Washington, DC: Government Printing Office, 2012), 4-8.

¹⁰*ADP 4-0, Sustainment*, 3.

improvisation is the ability to adapt sustainment operations to unexpected situations or circumstances affecting a mission.¹¹

In addition to understanding the meaning behind each principle it is also helpful to see examples of the effective application of the principles of sustainment. There are two examples during OPERATION IRAQI FREEDOM that demonstrate the effective application of the principles of sustainment; the preparation for fuel operations in support of the Iraq war in 2003 and the planned operational pause by V Corps outside of Baghdad. The examples demonstrate the effective application of the principles of sustainment during planning and execution that enabled campaign transition.

The first example took place during the fall of 2001. In anticipation of an Iraq war, Colonel Melvin Frazier, commander of the 49th Quartermaster Group (fuel and water), working with the 377th Theater Support Command, and Third Army, planned to meet an anticipated requirement of 2 million gallons of fuel per day for Corps level operations supporting the invasion of Iraq. Third Army coordinated with the Kuwait national oil company and an oil pipe line was laid directly to the Iraq border. By January and March 2003, Colonel Frazier had a system in place that could store 7.3 million gallons of fuel. Furthermore just prior to the invasion of Iraq, Colonel Frazier assigned one truck company comprised of 5K and 7.5 K fuel trucks to V Corps. When combined with the organic truck assets in V Corps this gave V Corps the ability to refuel every 100 km, or five times between crossing the line of departure in Kuwait and arriving in Baghdad.¹²

To put this in perspective, fuel estimates in support OPERATION IRAQI FREEDOM were similar to fuel estimates in support of OPERATION OVERLOAD. During OPERATION

¹¹Ibid.

¹²Gregory Fontenot, E. J. Degen, and David Tohn, *On Point, The United States Army in Operation Iraqi Freedom* (Washington DC: Government Printing Office, 2004), 147.

IRAQI FREEDOM, Coalition Forces Land Component Command (CFLCC) estimated a total consumption rate of 40 million gallons by D+20 and storage capacity of 7.3 million gallons of fuel.¹³ During OPERATION OVERLOAD in World War II, the allies estimated a total consumption rate of 32 million gallons by D+ 20 and storage capacity of 7.3 million gallons of fuel.¹⁴ In total, OPERATION IRAQI FREEDOM exceeded OPERATION OVERLOAD by only eight percent estimated fuel consumption by D+20 and almost the same for the storage capacity.

In the end, Third Army estimates in support of OPERATION IRAQI FREEDOM proved accurate. Although units ran low they did not run out.¹⁵ COL Melvin Frazier, 377th Theater Support Command and Third Army were able to provide the necessary amount of fuel through the comprehensive applications of the principles of sustainment. By conducting integrated sustainment planning 49th Quartermaster Group (fuel and water), 377th Theater Support Command, and Third Army were able to develop estimates in conjunction with operational concepts that generated a unity of effort. Additionally in an effort to enable responsiveness and increase simplicity COL Frazier exercised the principle of economy by assigning a truck

¹³Gregory Fontenot, E. J. Degen, and David Tohn, *On Point, The United States Army in Operation Iraqi Freedom* (Washington DC: Government Printing Office, 2004), 147.

¹⁴Daily fuel requirements for OPERATION OVERLOAD were compiled using the Historical Manuscripts Collection (HMC), *OUTLINE OF OPERATION OVERLOAD*, under file number 8-3.4 AA v.7. In this manuscript allied consumption rates were estimated in tonnage. For ease of reading, understanding, and comparison with consumption rates during Operation Iraqi Freedom, the tonnage of fuel consumption was converted to gallons. The formula is as follows: Operation Overlord fuel consumption estimates = 5,000 tons a day. 5,000 tons a day = 10,000,000 lbs a day. 1 x US Gallon of fuel = 6.073 lbs. 10,000,000 lbs a day / 6.037 lbs (weight of 1 x US gallon of fuel) = 1,646,632.63 (weight in gallons of fuel). 1,646,632.63 rounds to 1.6 million gallons a day, 1.6 x 20(# days) = 32 million gallons of fuel.

¹⁵Fontenot, Degen, Tohn, 147.

company to transport fuel throughout V Corps. COL Melvin Frasier exercised three principles of sustainment in this one action.¹⁶

First, he simplified employment of fuel distribution through task organization. Second, he provided an efficient means for the commander to employ sustainment resources demonstrating the principle of economy. Lastly, by delivering massive amounts of bulk fuel directly to Iraq, COL Melvin Frasier enabled the uninterrupted provision of sustainment thus exercising the sustainment principle of continuity. When applied appropriately, the principles of sustainment enabled the ability to extend operational reach over approximately three hundred miles into Iraq in support of OPERATION IRAQI FREEDOM.¹⁷

The second example took place in late March 2003. During OPERATION IRAQI FREEDOM Lieutenant General William Scott Wallace, V Corps commander, conducted a planned operational pause to build combat power, secure lines of communication, and set the conditions for an attack on Baghdad. As part of V Corps planning for OPERATION IRAQI FREEDOM General Wallace planned to slow the tempo and conduct an operational pause to build combat power to prevent culmination, extend reach, and continue the drive on Baghdad.¹⁸ The question was, when and where to slow the tempo to conduct the operational pause?

During the drive to Baghdad in 2003, V Corps LOCs stretched over three hundred miles and were consistently targeted by Iraqi paramilitary forces. These attacks were beginning to reduce food, water, and ammunition stockages of 3ID, the Corps main effort. General Wallace understood that his LOCs were becoming overextended and that once he crossed the Karbala Gap

¹⁶Fontenot, Degen, and Tohn; John B. Tisserand, III, Network Centric Warfare Case Study, "U.S. V Corps and 3rd Infantry Division during Operation Iraqi Freedom Combat Operations (March to April 2003)," vol. III, *Network Centric Warfare Insights* (A Center for Strategic Leadership Study, 28 August 2006): 56-59.

¹⁷Ibid., 147.

¹⁸Ibid.

he must attack all the way to Baghdad. More importantly General Wallace did not want to give the enemy an opportunity to counterattack or mass fires.¹⁹

Therefore General Wallace established three criteria that had to be met before the attack, two of which focused on setting the conditions for sustainment of the operation. First, he required sufficient logistics to be positioned forward into logistics support area Bushmaster outside Najaf. Second, he had to consolidate 3ID's combat power. Third he had to locate and assesses the condition of the Iraqi Medina Republican Guard Division.²⁰

Between the 25 and 27 March 2003, movement in V Corps area had all but ceased. The entire area was subjected to sand and rain storms that restricted visibility and movement. However, V Corps used this time to focus on resupply, clearing key choke points on the LOCs back to Kuwait, thus improving the major supply routes. By 29 March 2003, 3ID combat power was repositioning north, the Corps' logistics situation was improving as supplies were built outside of Najaff, and the 101st Airborne Division (Air Assault) and 82nd Airborne Division were securing critical LOCs. Two out of three criteria were met, combat power was consolidated and reorganized and sufficient sustainment was positioned forward.²¹

However due to the weather, V Corps was still unable to pinpoint the position of the Republican Guard forces. As a result V Corps decided on a plan to conduct an attack to expose enemy positions. On 31 March 2003, at 0600 local time V corps began the attack. V Corp's attack caused the Republican Guard forces to reposition, thus exposing their location. On 1 April 2003, the Iraqi Medina Republican Guard Division was largely destroyed and at midnight the same day, 3ID, the Corps main effort, attacked through the Karbala Gap resupplied with shortened LOCs.²²

¹⁹Tisserand, 57.

²⁰Ibid.

²¹Ibid.

²²Ibid., 60.

Because of the foresight, staff estimates, and planning V Corps understood that the tempo would have to be reduced to conduct an operational pause. This understanding when coupled with the assessment of the operational environment associated with an attack through the Karbala Gap presented a decision point and opportunity for V Corps to consolidate and reorganize. V Corps seized this opportunity and during the operational pause built combat power and prepared for future operations. Although this may seem like General Wallace increased his line of communication requirement, his focus was on consolidating at the right time and place in relation to his operational environment to extend his reach. By establishing a logistics base closer to Baghdad he shortened the supply line to his objective, increased his reach, and reduced risk on the disruption of his supply lines, thereby allowing him to exploit success upon passage of the Karbala gap and entry into Baghdad.

Each of the examples highlights the proper application of the principles of sustainment in planning and execution. As stated in current US Army doctrine a successful sustainment plan will extend operational reach, prevent culmination or loss of the initiative, manage transitions, exploit possible opportunities and mitigate risk.²³ It is fair to say that in the above examples the principles of sustainment were applied in an efficient and effective way that resulted in the successful execution of a sustainment plan that extended operational reach and prevented culmination.

THIRD ARMY'S CULMINATION SEPTEMBER 1944

There was bound to be a line somewhere in the direction of Germany where we would be halted...if not by the action of the enemy, than because our supply lines had been strained to their elastic limit.

—Dwight D. Eisenhower²⁴

²³ADP 4-0, *Sustainment*, 3.

²⁴Dwight, D. Eisenhower, *Crusade in Europe* (Garden City, NY: Doubleday and Company, Inc., 1948), 290.

Lieutenant General George Patton's historic pursuit of German forces during the month of August came to a halt in September 1944 for several reasons, the most noteworthy being the lack of fuel. By 03 September 1944 the Germans were able to begin consolidation at the German border and assume defensive positions while Third Army culminated.²⁵ However in order to fully appreciate this example it is necessary to examine Third Army's culmination in its entirety.

By July 1944 the Allies began to fear that they entered a stalemate with the German forces. In the shadows of World War I and in an effort to open their operational front before the winter months on the Western European front, Allied planners developed OPERATION COBRA. OPERATION COBRA was designed to penetrate German defensive positions, secure ports along the French coast, and attack east towards Berlin. On 25 July, 1944 the aerial bombardment began and by 27 July, 1944 the first Allied units penetrated German defenses and began their advance to isolate the Cotentin peninsula, secure Brittany's ports, and destroy the German Army. On 1 August 1944, Lieutenant General George Patton led Third Army on a historic drive that extended south to Brittany and then turned east to pursue German forces for over three hundred miles.

On 31 August 1944, the leading elements of Lieutenant General Patton's Third Army crossed the Meuse at Commercy and Pont-sur-Meuse while, 30 miles to the north, a task force entered Verdun some 200 days earlier than anticipated. In the month since it had been declared operational, the Third Army had swept across France in a remarkable demonstration of aggression, maneuver, and fighting power. At this very moment, having hotly pursued the retreating German Army for more than 340 miles, Patton's mood changed from euphoria to frustration and then to despair as his armor ground to an abrupt halt for want of gasoline.²⁶

²⁵U.S. Army, *The Operations*, vol. 1, After Action Report, Third US Army, 1 August 1944-9 May 1945. Volume 1 & 2 reproduced jointly by 652nd Engineering (TOPO) Bn., CO. B, 942nd Engineer AVN., (TOPO) Bn.

²⁶Peter Dye, "To What Extent Were Logistics Shortages Responsible for Patton's Culmination on the Meuse in 1944?" *Department of the Air Force Journal of Logistics* (18 October 1999): 1.

By the end of September 1944, Lieutenant General George Patton's Third Army exceeded its operational reach and sustainment was unable to prolong Third Army's endurance.²⁷ Third Army culminated and Lieutenant General George Patton was forced to transition his campaign from the attack to the defense.

Operations of Third U.S. Army as they developed during September underwent an abrupt change as the history-making pace of the Army's August advance was slowed, making a necessary type of warfare considerably different from that employed during the first thirty-one days of Continental action. At the beginning of the month it was apparent that, whatever the cause, an acute shortage of gasoline was seriously impairing the Army's mobility. Subsequently came other supply shortages, plus an enemy build-up and steadily worsening weather conditions. By the end of September Third U.S. Army had gone from an offensive to a defensive status.²⁸

Preceding culmination, in the month of August Third Army was beginning to require more fuel during exploitation than it was possible to deliver. In the last week of August Third Army's average difference between fuel requested and received was a shortage of approximately 656,555 gallons.²⁹ Third Army fell to one day of fuel on hand on 12 August 1944 and never maintained more than a day and a half of fuel on hand until late September 1944.

However, Third Army's operational tempo was not the only reason Lieutenant General George Patton ran out of fuel. From the beginning the European Theater of Operations logistics system was complicated and confusion over who was responsible for what function was common. Command relationships were poorly organized and generated overlapping authorities creating more questions on authority than they answered.³⁰

²⁷ADP 4-0, iii.

²⁸Third Army, After Action Report, 1 Aug 1944-9 May 1945, vol. 1, 61.

²⁹Third Army, After Action Report, 1 Aug 1944-9 May 1945, vol. 1, 61. Roland Ruppenthal, *Logistical Support of the Armies*, vol. 1 (Washington, DC: Office of the Chief of Military History, 1953), 503

³⁰Barry J. Dysart, *The Big 'L' American Logistics in World War II*, ed. Alan Gropman (Washington, DC: National Defense University Press, 1997), 370

When General Eisenhower assumed control of the European Theater of Operations, United States Army (ETOUSA) in January 1944, he organized the ETOUSA and the Communications Zone (ComZ), the administrative section of the rear area formerly known as the Service of Supply, under the G4. However this action made the ComZ commander, Lieutenant General J.C.H. Lee the G-4. In essence his senior logistical commander was now his G4; furthermore General Eisenhower later named Lieutenant General Lee the deputy theater commander. This created a growing tension between centralized control over supply and administration and the authority of field commanders.³¹

Despite the complicated sustainment organization, logistic planning rested with the Supreme Headquarters Allied Expeditionary Forces, and the ComZ which handled all administrative matters to include supply in the rear area.³² Two additional organizations were added to the logistical span of control to support the Allied forces forward of the rear area: the Forward Echelon Communications Zone and the Advance Section, Communications Zone (AdSec) to assist the combat commands in their own logistics planning. AdSec eventually handled all sustainment activities on the European continent and continued to move forward with the Armies.³³ Although logistics dominated every aspect of planning for the invasion of the European continent, the failure to ensure a unity of command in the logistics architecture

³¹Dysart, 370. This is further articulated in Steve R. Waddell, *United States Army Logistics, The Normandy Campaign, 1944* (Westport, CT: Greenwood Press, 1995), 13.

³²Dye, "To What Extent Were Logistics Shortages Responsible for Patton's Culmination on the Meuse in 1944?", 2 writes that the ComZ was originally organized as the SOS in 1942; Dysart, depicts in *The Big "L" American Logistics in World War II* a line and block chart of the logistical organization in the European Theater of Operations.

³³Dysart, *The Big 'L' American Logistics in World War II*, explains the relationship between ComZ and Ad Sec very accurately; that the Ad Sec was the "middle man," operating between the rear boundary of the Armies and forward boundaries of the base sections; Dye, "To What Extent Were Logistics Shortages Responsible for Patton's Culmination on the Meuse in 1944?" also speaks to the complicated command structure and use of the AdSec to meet immediate emerging logistical needs.

complicated all logistic efforts. This complication prevented simplification of logistic efforts while simultaneously preventing the proper integration of all elements of sustainment.³⁴

Although logistical planners developed appropriate estimates in an attempt to meet future requirements associated with OPERATION OVERLORD they were unable to support a three hundred mile pursuit. James Houston wrote in *The Sinews of War*, “Logisticians had been embarrassed by success. A breakthrough, the aim of all offensive operations was the one contingency against which they were unable to prepare.”³⁵ The planners applied mathematical formulas, computed port discharges based on infrastructure, climate, terrain, and most likely enemy courses of action.³⁶ However the estimates were planned against an extended timeline that stretched over a year, predicated on establishment of intermediary logistic support areas, and assumed an orderly development of the communications zone.³⁷ So yes, sustainment planners did anticipate operational requirements; however they anticipated the wrong requirements and most of all did not consider operational pauses in relation to operational reach. Additionally, SHAEF and ComZ failed to anticipate or consider a branch plan or sequel for a pursuit.³⁸ The cost of this failure was to be fully revealed in succeeding months during the Allied pursuit of German forces across Europe.

³⁴The elements of sustainment are defined in *ADP 4-0, Sustainment*, iii, as logistics, personnel services and health services support. Each of the elements is necessary to ensure operational success.

³⁵James, A. Houston, *Sinews of War, Army Logistics 1775-1953* (Washington, DC: Government Printing Office, 1966), 530.

³⁶Ruppenthal, *Logistical Support of the Armies*, 474-488.

³⁷Houston, 481.

³⁸A branch plan is necessary for assumptions that can't be confirmed or denied during the military decision making process. It allows the planner to consider a different path to achieve the same end state of the military operation. A sequel is best described as the same path to a different end state. In the case of SHAEF and ComZ it is reasonable to say that they failed to consider a branch associated with the pursuit.

In the months of June-July 1944, supplies looked to be well stocked; however this was due in large part to the stalemate between the Allies and Germans. On 31 July 1944 the actual supply tonnage on the continent was 93 percent of supplies planned.³⁹ The stalemate limited the required lengths of the LOCs and slowed the timeline for movement into Western Europe. The combination of the reduced LOCs and a lengthy operational timeline generated a false assumption that an adequate amount of supplies were stockpiled on the beach head. Already behind schedule, operations were about to generate an unanticipated acceleration in tempo that raced ahead of sustainment capabilities, preparations, and estimates.

The Allies achieved such a break out once OPERATION COBRA was launched. By D+98, 12 September 1944, they achieved gains and distances that were not anticipated until D+350, 256 days ahead of the operational timeline. The problem generated from this rapid thrust was that the sustainment operational environment was now nine months immature and the methodical sustainment plan incorporated into OPERATION OVERLORD was no longer feasible. The concept of support that called for the deliberate clearance of ports, re-build of rail, and sequenced establishment of logistical support areas, was unsuitable or attainable. What the planners expected to sustain over a year they now had to sustain between the months of August through October. Furthermore the breakout from Normandy and subsequent pursuit increased the amount of discharge volume and over the shore sustainment requirements than originally anticipated for the beaches of Normandy further exasperating the situation.⁴⁰

By the end of August there were supplies on the beaches of Normandy, but it could not be distributed due to insufficient transportation and inaccurate organization of supplies during the invasion. Even if the supplies were organized instead of stockpiled it would have been too little

³⁹Waddell, 67.

⁴⁰Ruppenthal, *Logistical Support of the Armies*, 488,493.

too late. Third Army in need of the supplies was over 300 miles away without adequate supply transportation. However successful the Allied planners were in stockpiling the supplies on the beach head in support of Operation Overload they were unsuccessful in ensuring that sustainment resources were provided in an economic manner. The resources were fed onto the continent in an inefficient stockpile that reduced the ability for the commander to employ all assets to achieve the greatest effect possible. The combination of the logistical preparation of the battlefield, failure to determine possible requirements for an operational pause, and failure to plan a branch or sequel in anticipation of sudden success following OPERATION COBRA laid the seeds for culmination.⁴¹

This failure to anticipate severely constricted the responsiveness of the supply distribution.⁴² The deliberate establishment of logistical support areas to include ports, tied to supply depots, over a timely development of the communication zone, was the lynch pin to a responsive logistic plan. However, the explosive success of the Allied break out and pursuit suddenly extended supply lines that voided any attempt to maintain the principle of responsiveness. Furthermore, when the decision was made to cross the Seine and continue pursuit the original sustainment assumptions were invalidated and the concept of sustainment was no longer feasible to support Third Army's pursuit.⁴³ Roland Ruppenthal wrote in *Command Decisions*;

⁴¹Dysart, 56-57.

⁴²Responsiveness is defined in ADP 4-0, *Sustainment*, as the ability to react to changing requirements and respond to meet the needs to maintain support.

⁴³Ruppenthal, *Logistical Support of the Armies*, 583. Dwight, D. Eisenhower confirms the supply issues with the accelerated time line in, *Crusade in Europe*, 302; Forrest, C. Pogue, *The Supreme Command* (Office of the Chief Military History, United States Army, Washington, DC: Government Printing Office 1954), 253, 256-257; George, B. McDonald, *Command Decisions, Logistics and the Broad-Front Strategy*, (Center of Military History, United States Army, Washington, DC: Government Printing Office, 1990), 432, explains that for logistical purposes the invasion of Europe was geared to a methodical advance and that the erratic, explosive dash to the Seine and closure on the German Border two hundred and four days ahead of schedule exceeded logistic capability. With the depots hundreds of miles behind the front, a decimated rail

Contrary to plan, therefore, and as a direct consequence of the August decisions, considerably greater forces were being maintained at much greater distances than contemplated. This was accomplished despite an insufficiency of motor transport despite the failure to open the Brittany ports, and despite the premature assumption of responsibilities in connection with the civil relief of Paris. The probability that logistic limitations might strait-jacket tactical operations had been realized as early as 24 August 1944, when General Eisenhower expressed anxiety over the Allies inability to undertake, simultaneously, the various operations which appeared desirable.⁴⁴

General Eisenhower knew that there would be a culmination point or point at which operations could not be sustained. However on 10 September 1944, General Eisenhower authorized an advance by Third Army and admitted that the supply organization was at a breaking point, but the operation was a gamble worth taking to disintegrate the German forces. Beginning on 26 August 1944 it was more appropriate to label the US supply system as frantic instead of responsive.⁴⁵ The outcomes of this change in plans were paid for well into September through November, 1944. Sustainment continuity, the uninterrupted provision of sustainment across all levels of war, was at best below standard and forced the hand of improvisation.⁴⁶

Because of the ineffectiveness of the application of the principles of sustainment the only way to even attempt to sustain Patton's Third Army and transition culmination to the attack was through improvisation. As defined in *ADRP 4-0*, improvisation is the ability to adapt sustainment operations to unexpected situations or circumstances affecting mission. A unique example of improvisation associated with Third Armies culmination in 1944 lies with the red ball express.

system, and shortage of transport, the logisticians did not have the means of getting the supplies forward. David Colley writes in *The Road to Victory* (Washington, DC: Brassey's Publishing, 2000), 22-23 that the Allies were to reach the Seine by 06 September and halt while the depot system and supply base were developed. However, the German defeat in the Falaise and Eisenhower's authorization to cross the Seine altered the logistical concept of support. Because of the rapid advance ahead of schedule by the allies, supplies could not keep up with the Allied forces.

⁴⁴Ruppenthal, *Command Decisions, Logistics and the Broad-Front Strategy* (Washington, DC: Center of Military History, 1990), 423.

⁴⁵Ruppenthal, *Logistical Support of the Armies*, 583.

⁴⁶ADRP 4-0, *Sustainment*, iii.

RED BALL EXPRESS, TOO LITTLE TOO LATE

It takes little skill or imagination to see where you would like your army to be and when; it takes knowledge and hard work to know whether you can maintain them there.

—Napoleon⁴⁷

To truly understand the nature of the Red Ball Express transportation effort it is necessary to analyze the entire transportation planning effort from its conception. Initial logistical assumptions for Normandy and follow on operations estimated that trucks would not be used for supply hauling at distances greater than 150 miles on the lines of communications and that anything greater than 150 miles would be moved by rail.⁴⁸ Additionally, using troop and logistical planning factors, the Transportation Corps calculated in the summer of 1943 that they would require 240 truck companies to meet the needs for hauling. Theater headquarters rejected the estimate and approved an allocation of 160 companies. By July 1944, only 94 of the truck companies had arrived on the European continent. In addition to the reduction of authorized transportation companies and the untimely delivery of equipment, the Transportation Corps also recognized a shortage of personnel to run twenty-four hour operations seven days a week. By the time the request for additional troops was made in 1944, the War Department established a ceiling for the European theater forcing SHAEF to harvest additional troops from organic units. By mid-August 1944, rail line development had limited capacity and could not keep up with the pursuit, anticipated requirements, or supply line distances that extended from 300-450 miles from the German frontiers to beaches of Normandy with no supply depots in-between.⁴⁹ In essence,

⁴⁷Martin Van Creveld, *Supplying War, Logistics from Wallenstein to Patton* (New York: Cambridge University Press, 2004), 231.

⁴⁸Ruppenthal, *Logistical Support of the Armies*, 553.

⁴⁹David Colley, 43. This is further supported by Ruppenthal, *Logistical Support of the Armies*, 554-559. By September supply lines reached 450 miles to the German frontier and it was upon the Red Ball Express to move the supplies. Additionally Ruppenthal in *Command Decisions*

the conditions were set in August of 1944 for a tactical level problem to become a theater echelon priority.

During the second week of August 1944, the Advance Section took the first step to meet the growing transportation demand. On 10 August 1944 two companies of 45-ton tank transporters were converted to cargo carriers. This was the first indication that a unique transportation effort was required to keep the First and Third Armies minimally supplied. To meet this requirement the Red Ball Express was borne.

The Red Ball Express was an ad hoc affair improvised to meet the minimum daily requirements of the First and Third Armies. The Advanced Section began organization of the Red Ball Express on 23 August 1944 and two days later on 25 August 1944 executed the first convoys eastward. To sustain minimum daily requirements, Lieutenant Colonel Loren A. Ayers, Chief of Motor Transport Service, Headquarters, Communications Zone (ComZ), and Major Gordon K. Gravelle also of ComZ Headquarters implemented a plan that called for a massive adjustment to task organization of personal and equipment from across the ComZ. The plan consolidated most of the ComZ's distribution assets into an organization called the Advance Section's Motor Transport Brigade (MTB). The MTB was authorized one hundred and forty-one truck companies of which five companies were used for railhead operations. By 29 August 1944 one-hundred and thirty two companies with strength of almost 6,000 vehicles were actively engaged 24 hours a day, seven days a week in executing Red Ball Express operations. On 29 August 1944 the Red

on page 421-422 articulates that the inability of the rail and pipelines to keep pace with the pursuit, failure of the Brittany port to be captured, and only one major port operational (Cherbourg), as well as air resupply falling short of its predicted capacity, left the burden of the forward movement of supplies principally on motor transport to deliver daily needs.

Ball Express delivered over 12,000 tons of supply.⁵⁰ By 5 September 1944, of the 100,000 tons of supplies moved, the Red Ball Express moved 88,930 tons.⁵¹

However, the sacrifice associated with this effort was felt at every level. At the Army level, First and Third Armies were instructed by General Bradley to leave their heavy artillery west of the Seine and use the freed cargo trucks for supply transportation. Additionally in relation to this order the ComZ was instructed not to move heavy caliber ammunition beyond the Siene. Both Armies were using every available resource to increase transportation capacity. Vehicles were drawn from evacuation hospitals, chemical battalions, mobile refrigerator companies, signal units, ordnance companies, and even field artillery battalions were converted to transportation units. In the case of First Army, by the end of September their converted field artillery battalions alone moved 17,200 tons of supply. Outside of the combat zone, above the Army echelon, the ComZ was also creating transportation capability from scratch.⁵²

By the end of the pursuit in the middle of September 1944 ComZ created provisional truck companies from service support and combat organizations as well as ceased all unessential hauling. For example, two engineer general service regiments were reorganized into seven truck companies each, a chemical smoke generating battalion was reorganized as a truck battalion, anti-aircraft units provided ten additional companies, and most surprisingly three infantry divisions; 26th, 95th, 104th, were immobilized and their vehicles used to fill provisional truck companies. Additionally 1,500 vehicles intended for issue to other units were diverted to support the Red Ball Express.⁵³ Roland Ruppenthal, in *Logistical Support of the Armies*, says “there is no doubt that but for these special measures in marshaling the transportation resources in both the ComZ and

⁵⁰Ruppenthal, *Logistical Support of the Armies*, 559; Colley, 47, 49, 87.

⁵¹Waddell, 127.

⁵²Ruppenthal, *Logistical Support of the Armies*, 570.

⁵³Ruppenthal, *Logistical Support of the Armies*, 559, 570; Colley, 47, 49, 87.

combat zones the advance of the armies could not have been sustained as far as it was.”⁵⁴

However, the transportation effort in support of the Red Ball Express came with a significant price tag in the maintenance of equipment and performance of drivers for months to come.

Although the Red Ball Express is considered an “improvisational” success as it pertains to the principle of sustainment, in the end it had its faults. By mid-September to the end of the month major repairs on transportation equipment more than doubled from 2,550 to 5,750. The rising maintenance effort was further compounded by: overloading vehicles by 100 percent as an accepted and authorized practice, excessive speed on poor terrain (drivers habitually operated their trucks at twice the 25 mph speed limit), line hauls extending up to 300-400 miles one way, and the inability of routine maintenance to occur due to continuous operations. More dangerous than the equipment exhaustion was the strain placed on the operators.

Due to the nature of the provisional companies and ad hoc organization there were many different levels of trained and untrained drivers. Furthermore fatigue played a large role, as the drivers grew weary and the demands increased, accidents also increased. Additionally there were instances of malingering, sabotage, and driver’s intentionally rendering the equipment inoperable. In the absence of MP’s for traffic and convoy control, there were even cases of drivers selling their cargo on the French black market.⁵⁵ Roland Ruppenthal in *Logistical Support of the Armies*, vol. 1, describes the Red Ball express as a gamble to extend operational reach.

Red Ball bore many of the defects of an operation hastily organized under the pressure of events to meet an emergency: there had been insufficient time for planning: extensive use had to be made of hastily organized provisional units, with all the disadvantages inherent in such practice: and there was a costly attrition of equipment due to the necessity of temporarily suspending many of the normal precautions of

⁵⁴Ruppenthal, *Logistical Support of the Armies*, 559; Colley, 570.

⁵⁵Houston, 528; Colley, 102-104. General Eisenhower describes in his book *Crusade in Europe*, that Red Ball express trucks would operate continuously, that “every vehicle ran at least twenty hours a day. Relief drivers were scrapped up from every unit and the vehicles were allowed to stop only for necessary loading, unloading, and servicing.”

maintenance. Red Ball was part of a gamble, part and parcel of the tactical decision to cross the Seine and exploit to the full the existing tactical advantage. That gamble had prospects of great rewards, and in the light of the optimistic tactical outlook at the time the all-out logistic effort was undoubtedly justified despite its great cost. But the result was debilitating to the logistic structure, and the effects were to be felt for several months to come.⁵⁶

By 13 September 1944 the Red Ball Express could not sustain the operational reach of Third Army. Despite all of the effort exerted by ComZ and ADSEC, Third Army came to a halt in the shadow of the Siegfried Line. General Omar Bradley wrote in *A Soldier's Story*,

But news of this border crossing could not hide the fact that at last we had run out of momentum, for no sooner had our troops crossed the frontier than we jarred to a sudden halt. The six dizzying weeks of breakout had ended. For the next two months we were to wait on the Siegfried Line until the long supply line that reached back to Cherbourg was replaced by another at Antwerp....Our dash to the Rhine had failed and with it went our one best hope for an early German surrender.⁵⁷

By 14 September 1944, Third and First Army culminated. Third and First Army no longer possessed the capability to continue its current form of operations.

The breakout and unanticipated lengthening of Third Army LOCs created a logistic response that focused on a continuous attempt at sustaining an unachievable concept of support. The lack of a branch plan for a pursuit and lack of transportation assets on the continent set the conditions in which the sustainment plan could not respond adequately. By its nature the sustainment architecture planned and developed for operations in Europe along a methodical long drive was not suitable, feasible, or acceptable for an explosive pursuit across Europe. In the end, the logistical estimates provided realistic expectations and mathematical confirmation that there were enough supplies in the pipeline and eventually on shore; however no matter how much supply made it to the beaches logistics was unable to distribute the supplies at a pace three times

⁵⁶Ruppenthal, *Logistical Support of the Armies*, 571.

⁵⁷Bradley, 413-414.

faster than anticipated.⁵⁸ Although it was understood there would need to be an operational pause to extend operational reach General Eisenhower ignored this reality and continued pursuit until momentum stalled, in essence the critical point of failure was the lack of a decision to conduct an operational pause.⁵⁹ As a result, Third Army reached culmination and sustainment could no longer extend operational reach, prolong endurance, or even sustain a limited ground offensive.

EFFICIENCY AND EFFECTIVENESS—DOES CURRICULUM SUPPORT DOCTRINE?

A ton of cargo moved made port officials look efficient, but if ADSEC needed something else, a ton of cargo moved and not wanted took its place.
—Steve Waddell⁶⁰

Third Army's drive in 1944 to Berlin and V Corps drive to Baghdad in 2003 have many similarities and differences in the discussion of operational reach. It is useful to compare and contrast both drives to sharpen the differences between the mechanical and holistic application of the principles of sustainment.⁶¹ By sharpening these differences this comparison will demonstrate how the current professional education of sustainment leaders generates a dangerous "data" anchoring trap that weighs efficiency over effectiveness thus clouding the consideration of operational reach.⁶²

⁵⁸Waddell, 133; Ruppenthal, *Logistical Support of the Armies*, 509.

⁵⁹Eisenhower, 290-293; Ruppenthal, *Logistical Support of the Armies*, 490.

⁶⁰Waddell, 134.

⁶¹Merriam-Webster dictionary, at www.merriam-webster.com accessed on 6 August 2013, defines holistic as relating to or concerned with wholes or with complete systems rather than with the analysis of, treatment of, or dissection into parts. In this paper mechanical is used in such a way as to describe analysis by individual parts instead of a whole of the parts.

⁶²Merriam-Webster dictionary, at www.merriam-webster.com accessed on 27 July 2013 defines efficiency as the effective operation as measured by a comparison of production with cost (as in energy, time, and money): the ratio of the useful energy delivered by a dynamic system to the energy supplied to it. It also defines effective as producing a decided, decisive, or desired effect. A useful example to illustrate the difference between efficiency and effectiveness is an example of a resupply operation to a company patrol base in Afghanistan. By this definition it is

Currently sustainment doctrine and the sustainment educational system are out of balance. Current logistic educational system approaches the Sustainment War fighting function as a large machine that produces specific support and services. By applying a mechanistic lens the system naturally produces a mechanical output. This mechanical output sets a trap that produces viable logistic estimates but fails to account for critical variables associated with operational reach. In essence, sustainment estimates compute head counts, equipment densities, map distances, and consumption rates, but by framing the problem as a mathematical output the logistician fails to anticipate the actual operational reach, sustainment durability, and associated decision points. In short, the mechanical frame work produces misleading measurements that are confirmed through a sense of efficiency, science is produced without art. More importantly, this approach unknowingly strays from the current sustainment doctrine, *ADP 4-0*, 31 July 2012 in which the focus is on ensuring operational success by sustaining operational reach.⁶³

While developing a concept of support, failure to focus on operational reach as a framework and to apply the principles of sustainment as criteria in the initial logistic estimates leads to a mathematical approach. This approach anchors the concept of support to a system that measures success on its efficient provision of support and services verse how long operational

considered efficient to fill a request of ammunition to a company patrol base in Afghanistan by loading the ammo on a Palletized Loading System flat rack in bulk and deliver with other supply requests in one lift. The flat rack is dropped inside of the patrol base, the combat logistic patrol departs, and a company commander is left to figure out how with one platoon providing security, the other on patrol, and the third just returned, to break the supply without material handling equipment or available man power. This action is efficient in delivery but in-effective to the customer. This highlights the dialectic between efficient and effective. What is efficient to the sustainer in this example is not effective to the customer. If the supplies were organized in smaller packages, delivered in smaller increments, over more time this would be effective to the customer and less efficient to the sustainer.

⁶³Course structure provided by the Captain Career Course Training Department located at the Ft. Lee, VA. through a “period of instruction” overview on 22 July 2013, and the U.S. Army Command and General Staff College, Advance Book, *Support Operations* (Phase II), (Fort Leavenworth, KS: Defense Automated Printing Service, 2013), 3ADP 4-0, *Sustainment*, 3.

reach can be sustained. By measuring success on the efficient output of support and services the effective application of sustainment to the warfighter is at risk. For example, on the European continent in 1944, ADSEC,

In evaluating its performance, noted that by utilizing all transportation assets, they had delivered the total tonnages called for by the armies, but that items delivered were not always what the combat units ordered. Since the armies often seemed to order supplies without knowing if requested items were on the continent, dump commanders often shipped what they had, including materiel that the armies did not request. Thus, ADSEC saw that they had performed their function in delivering what they had at the requested tonnage levels, and if supply dumps lacked all the required items that was someone else's problem.⁶⁴

Furthermore, as seen in the table below, the planned supply vs. actual supply on the European continent in July, 1944 indicated that the Allies would be well supplied for the breakout.

Table 1. Supplies, Vehicles, and Troops

DATE	Supplies (Tons)		Vehicles		Troops	
	Planned	Actual	Planned	Actual	Planned	Actual
30 Jun 1944	359,900	289,827	109,921	70,910	578,971	452,460
		80.5%		64.5%		78.1%
31 July 1944	986,043	918,735	170,425	177,575	1,009,925	867,662
		93.2%		104.2%		85.9%

Source: Steve Waddell, *United States Logistics, The Normandy Campaign, 1944* (West Port, CT: Greenwood Press, 1994), 67.

However when the tonnage included such things as 11,070 corn brooms, 12,789 cotton mops, 5,269 large garbage cans and 32,616 reams of mimeograph paper, there is no question that supplies could be efficiently stockpiled. Unfortunately the efficient stockpile proved completely

⁶⁴Waddell, 134.

ineffective to the troops needing ammunition and fuel while busting the hedgerows and executing the pursuit.⁶⁵

During the Iraq invasion in 2003 there was a similar “efficient” stockpile of supplies in Kuwait. In the General Accounting Office, Defense logistics review on Operation Iraqi Freedom (OIF) logistics, the report states that although major combat operations during the initial phases of OIF were successful, there were indications of substantial logistic problems throughout theater. The summary further describes several issues contributing to the logistic problems: backlogs of hundreds of pallets and containers at multiple sites, discrepancy of \$1.2 billion between materiel shipped to Army activities and received; cannibalization of vehicles and potential reduction of equipment readiness due to the unavailability of parts, some of which could not be located because of inadequate asset visibility; the duplication of many requisitions and circumvention of the supply system as a result of inadequate asset visibility; and the accumulation at the theater distribution center in Kuwait of hundreds of pallets, containers, and boxes of excess supplies and equipment. Even observed was a wide array of materiel, spread over many acres that included a mix of broken and usable parts that had not been sorted into the appropriate supply class, unidentified items in containers that had not been opened and inventoried, and items that appeared to be deteriorating due to harsh desert conditions.⁶⁶ Although the supplies were making it to theater, the stock pile was poorly organized, distributed, and tracked thus preventing the actual logistic outputs from meeting the desired outputs.

Much like the supplies on the beaches of Normandy from July through November 1944, the supply in Kuwait during 2003 was disorganized at the theater point of entry. Also, similar to

⁶⁵Waddell, 65.

⁶⁶General Accounting Office, *Defense Logistics: Preliminary Observations on the Effectiveness of Logistics Activities during Operation Iraqi Freedom* (Washington, DC: Government Printing Office, 2003).

the two operations was the distance and rapid lengthening of the LOCs. Third Armies pursuit of German forces on the European continent in 1944, and V Corps drive to Baghdad in 2003 both extended LOCs between 200-300 miles from their closest supply depot. Despite the similarities and the seeming foreshadow of culmination, General Wallace, the V Corps Commander in 2003, made a decision to execute an operational pause to maintain operational reach thus shortening his LOCs. As a result, General Wallace reduced his LOCs from 200-300 miles to approximately 100 miles. He shortened his LOCs by echeloning sustainment forward and establishing a logistic support area vicinity Najaf. The critical point of success associated with maintaining V Corps operational reach was not the number of trucks or tonnage of supply moved, it was the point when General Wallace made the decision to pause between 25 and 30 March 2003.⁶⁷

In contrast to General Wallace's decision to pause, General Eisenhower's critical point of failure was the lack of a decision to conduct an operational pause to account for the rapid lengthening of the LOCs. By not deciding to pause or considering which unit to pause, First and Third Army culminated. The ensuing sustainment crisis response to the culmination created a domino effect that lasted for several months into January 1945.⁶⁸

When the sustainment crisis hit Third Army during the last week of August 1944 the mechanistic approach resulted in a "fix the part" effort instead of a holistic "fix the system" that generated multiple second and third order effects. For example, transportation was marshaled to limit the growing fuel crises to continue the pursuit. However this short sighted, singular solution to resolve the fuel shortage caused less and less ammunition as well as much needed cold weather

⁶⁷Tisserand, 56-57, 82-83.

⁶⁸Ruppenthal, *Logistical Support of the Armies*, 490-493, 515; Eisenhower, 290-291.

clothing to be brought to the front, which lead to artillery shortages and ill-supplied troops during the months September thru December.⁶⁹

The idea that that operational reach must be the corner stone to any sustainment plan is demonstrated by the above examples. Without consideration for operational reach and operational reaches' associated decision points, the Sustainment War fighting function will not be able to fully contribute to the commander's intent. Operational reach must be framed with the principles of sustainment and then useful logistic estimates critical to the concept of support can truly be created. Current sustainment doctrine validates this requirement by equating operational success with operational reach. In the very first paragraph of *ADP 4-0*, 31 July 2012, it states;

ADP 4-0 and ADRP 4-0, Sustainment, supports *ADP 3-0* and *ADRP 3-0, Unified Land Operations*. This principle level doctrine focuses on how the elements of sustainment: logistics, personnel services, and health services support ensure operational success by giving Army forces operational reach, freedom of action, and prolong endurance. It serves as the doctrinal bridge fostering the understanding of the seamless nature of essential linkages of sustainment capabilities from the strategic base to the tactical level operations.⁷⁰

However, when compared to curriculum in the current sustainment capstone courses, operational reach is barely mentioned. When operational reach is mentioned it is only mentioned as an output of estimates, and sidelined by the science of sustainment.

For example, when looking at the training that impacts the majority of sustainment planners, it is useful to assess two critical capstone courses that are mutually supporting. First is the Combined Logistics Captains Career Course (CLC3) and second is the Support Operations Course. Each of these courses provides key sustainment education at critical junctures in the sustainment officer's professional development.

⁶⁹Ruppenthal, *Logistical Support of the Armies*, 515-520.

⁷⁰*ADP 4-0, Sustainment*, 3.

The Army Logistics University, located at the Army Sustainment Center of Excellence, Fort Lee, VA states that the scope of CLC3 is “to develop leaders who are technically and tactically competent in Full Spectrum Operations (FSO), within a Joint Interagency Multi-National environment: able to serve as branch experts on battalion and/or brigade staffs, and command and/or lead company sized units.”⁷¹ However, as described in *ADP 4-0*, are the sustainers set up to understand that the elements of sustainment are meant to ensure operational success by providing for operational reach, freedom of action and endurance? ⁷² Or does the curriculum set the students up to be experts that can merely drive the sustainment system to efficiency?

My assessment is the sustainers are not positioned to properly consider operational reach. However there is potential within the “sustainment overview” period of instruction (POI), that if expanded could provide the framework for the understanding of operational reach associated with *ADP/ADRP 4-0*. This expansion would bring the CLC3 curriculum more in line with *ADP/ADRP 4-0* in support of *ADP/ARP 3-0* allowing for the possible orientation towards operational success through reach, freedom of action, and endurance instead of orientation to MDMP outputs.

The CLC3 curriculum taught in a 20 week course is divided into two sections, the common core and the logistic phase. The common core lasts 7 weeks and covers the basics in leadership, culture and mission command, unified land operations and training, and MDMP. The second section is the logistics phase, this phase lasts twenty weeks. The logistics phase covers a

⁷¹Headquarters, Department of the Army, *Unified Land Operations*, http://www.almc.army.mil/ALU_COURSES/810C22QMPIII-MAIN.htm, (accessed 26 July 2013). *ADRP 3-0*, 2-2, has updated language in which Full Spectrum Operations (FSO) has been removed and has been replaced with decisive action (DA). Comparative to FSO in its nature, decisive action is the umbrella under which combined arms maneuver and wide area security reside. When researching the actual CLC (3) curriculum *ADRP 3-0*, *ADP 3-0*, and current doctrine are used in conjunction with DA. In light of this it is necessary to substitute FSO with decisive action.

⁷²*ADP 4-0, Sustainment*, iii, 3.

sustainment overview, logistics planning tools, and then dives into each sustainment specialty ranging from transportation, maintenance, general supplies to ammunition, fuel and water, and medical, culminating with the military decision making process and a capstone tactical logistics exercise.⁷³

The common core of the CLC3 course is well grounded in unified land operations and is structured to prepare company commanders for command while the logistics phase is well suited to ingrain the sustainment functions. The course creates the opportunity for students to become experts in the sustainment trade but fails to enable the students to artfully develop their sustainment skill as it applies to operational reach. Of all the POIs the most relative to assess if sustainers are able to ensure operational success by providing operational are unified land operations, mission command, operations, MDMP, the phase II sustainment overview and the tactical logistic exercise. The other courses are restricted to a singular topic relating to a logistic specialty.⁷⁴ To analyze each of the above periods of instruction it is necessary to identify the Terminal Learning Objectives (TLO).

⁷³The course structure was provided by the Captain Career Course Training Department located at the Ft. Lee, VA. through a “period of instruction” overview on 22 July 2013. Additional information regards specific TLO and ELO’s for each of the lessons were provided by Training Development at the Captains Career Course on 09, 12 August 2013.

⁷⁴The course structure was provided by the Captain Career Course Training Department located at the Ft. Lee, VA. through a “period of instruction” overview on 22 July 2013. Additional information regards specific TLO and ELO’s for each of the lessons were provided by Training Development at the Captains Career Course on 09, 12 August 2013. Of all the courses offered, the courses that were not specific in nature but that applied to making decisions across the breadth of the sustainment functions were analyzed in depth. The courses related to a single topic although analyzed were not assessed for their application of operational reach because they are designed specifically to provide expertise in that topic area. The courses are; Transportation, Property Management, Maintenance Operations, Ammunition, General Supplies, Bulk Water, Fuel, Mortuary Affairs, Air Delivery, and Medical planning.

First, the Unified Land Operations module is comprised of nine POIs of which seven are directly relevant.⁷⁵ They are; Doctrine Foundation, Fundamentals of Defensive and Offensive Operations, Homeland Defense and Defense Support, Stability Operations, and Tactical Operations. The intent of the lesson plan is to establish an understanding and working knowledge of tactical fundamentals to provide the student the ability to apply or adapt doctrine during tactical problems.⁷⁶

The Unified Land Operations (ULO) relevant TLOs to analyze are US Army doctrinal concepts in ULO and US Army decisive actions of ULO. The associated enabling learning objectives in this period of instruction are to analyze the Army's operational concept associated with fundamentals of the defense, offense, homeland defense, support and stability operations to include doctrine foundation and tactical operations.⁷⁷ Of the readings and reference material the material common throughout is *ADP/ADRP 3-0, Unified Land Operations*, *FM 3-90, Offense and Defense*, and *FM 3-90.6, Brigade Combat Team*. Despite being the Logistics Captains Career course *ADRP/ADP 4-0, Sustainment* is only required reading once during the tactics block.

Although the students are afforded the opportunity to become well familiar with ULO, throughout the lesson plan, the plan is not structured to give them a similar working knowledge of how sustainment nests with ULO in conjunction with *ADP/ADRP 4-0*. In this lesson plan a critical opportunity is missed to truly nest the curriculum with the current Sustainment doctrine. The opportunities to ensure that future sustainment leaders can apply the elements of logistics

⁷⁵The nine POIs provided by the Captain Career Course Training Department are Doctrine Foundation, Fundamentals of Defensive and Offensive Operations, Homeland Defense and Defense Support, Joint Operations Roles and Functions, Law of Armed Conflict, Stability Operations, and Tactical Operations. Of the nine POIs all are considered in this paper except for the Law of Armed Conflict, and Joint Operations.

⁷⁶U.S. Army, Training Development Captain Career Course Lesson Plan 701-U501, *Doctrinal Foundations*, version 1, 12 August 2013.

⁷⁷*Ibid.*

holistically to contribute to identifying potential decision points associated with providing operational reach is overlooked in the ULO POI. The sustainment doctrine is over looked in consideration of providing much needed instruction relevant to company command. As a result, in the common core, the burden of responsibility to nest the curriculum with *ADP/ADRP 4-0* rests with the lessons; mission command, operations, MDMP, and in Phase II the sustainment overview.

The POI covered in Mission command, operations, and MDMP, present opportunities for students to exercise more than just the provision of logistics as instructed during the second part of CLC3, the logistics phase. The structure of the Mission command, operations, and MDMP TLOs and ELOs drives the student to a fundamental understanding of mission command and the development of a tactical plan. However when bridged to MDMP, instead of considering sustainment contributing to the commander's decision making process regards operational reach the student falls into developing planning estimates to fill MDMP requirements and not once in the references or reading was *ADP/ADRP 4-0* referred to. The planning estimates are generated using the tools developed in the logistic functions lessons.⁷⁸ These lessons describe specific functions in depth and enable students to generate efficient numbers, distances, and estimates, without consideration for operational reach as discussed in *ADP/ADRP 4-0*, thus anchoring the plan to a data trap.⁷⁹

⁷⁸Course structure provided by the Captain Career Course Training Department located at the Ft. Lee, VA. through a "period of instruction" overview on 22 July 2013. The logistic function courses are; Transportation, Property Management, Maintenance Operations, Ammunition, General Supplies, Bulk Water, Fuel, Mortuary Affairs, Air Delivery, and Medical planning.

⁷⁹The perspective of a "data trap" is derived from philosopher Andre' Kukla's, *Mental Traps, the Over thinker's Guide to a Happier Life* (Canada: Anchor 2007), and Colonel (Retired) Stephen J. Gerrras, Ph.D., *Thinking Critically About Critical Thinking: A Fundamental Guide for Strategic Leaders*. Kukla writes that mental habits develop traps that waste our time and energy. He describes the difference between what we think about vs. how we think that is important, and that the mental traps are often consequences of viewing the world the wrong way. Additionally

At first this may seem appropriate giving the constraints of time and short term goal to prepare the individual for command. However when looking at the sustainment system as a whole it is setting the foundation for sustainment leaders in a trap. The trap steers sustainers to an overreliance on the scientific approach, reinforced by an imbalance weighing efficient production over effective application. In essence the science of sustainment begins to dwarf the art associated with operational reach.⁸⁰

This, method produces a natural framework of which the idea in sustainment doctrine to “ensure operational success by sustaining operational reach, freedom of action, prolonged endurance,” is subjugated to efficient outputs instead of effective application.⁸¹ Without consideration of operational reach framed by the principles of sustainment and operational environment the concept of support can become wedded to the estimates. In this case the sustainer will not be able to contribute to the decision regards to: when and how to conduct an operational pause.⁸²

COL Gerras writes that there are underlying thinking processes that guide our behavior and if we don't recognize this underlying bias than our point of view is always incomplete and sometimes wrong. These ideas, as they pertain to sustainment planning, articulate that a sustainer can get so caught up in viewing an operation through his estimates and planning factors or as some call it “doing the hard math” to determine a logistic output that they are trapped in a habitual mode of thinking that does not contribute to the analysis of operational reach. This habitual mode of thinking is further exasperated by our sustainment curriculum design and imbalance with doctrine.

⁸⁰ADP 3-0, *Unified Land Operations*, 14, describes the requirement of support and services to ensure freedom of action, endurance, and operational reach as a primarily a function of sustainment. *ADP 4-0, Sustainment* further defines operational reach as the distance and durations which a unit can successfully employ military capabilities.

⁸¹ADP 3-0, *Unified Land Operations*, 14, describes the requirement of support and services to ensure freedom of action, endurance, and operational reach as a primarily a function of sustainment. *ADP 4-0, Sustainment*, iii, defines operational reach as the distance and durations which a unit can successfully employ military capabilities.

⁸²As described earlier, the critical point of failure in the culmination of the allied pursuit of the Germans following the breakout was not the shortage of transportation, disarray of supply stocks etc. It was the failure of GEN Eisenhower to decide to conduct an operational pause.

However, there is an opportunity in phase two called the sustainment overview to correct this. The sustainment overview provides a comprehensive sustainment overview to include applicable logistic exercises. The lesson serves as a way to better nest the CLC3 curriculum with *ADP/ADRP 4-0* to ensure that operations and sustainment remain linked during the curriculum in support of Unified Land Operations per current US Army doctrine.⁸³

For example, in the sustainment overview, not only are the students required to reference *ADP 3-0*, they are also required to reference *ADP 3-07*, *ADRP 4-0*, *ALM 69-6932-HB*, *CGSC ST 101-6*, *FM 10-1*, *FM 3-06*, *FM 55-30* (Superseded with *ATP 4-11*), *FMI 4-90.1*, and *FMI 4-93.2*.⁸⁴ The TLO of the class describes key components of sustainment support but it does this by framing the lesson in relation to anticipated operational realities. The lesson considers an operational environment consisting of non-linear battlefields in which much of the logistic resources are decentralized to Brigade Support Battalions and Sustainment Brigades.⁸⁵ In essence, it provides a better framework for the sustainer to exercise a holistic approach when generating and applying logistic estimates to the concept of support and MDMP process. Although the POI is more inclusive, unless it is instructed focusing on operational reach it will fall into the same trap aforementioned. This leaves the sustainers with only one specific sustainer course remaining in which to nest sustainment doctrine and curriculum. That course is the Support Operations course.

⁸³*ADP 4-0, Sustainment*, iii, states that Operations and sustainment must be linked. *ADP 4-0* provides the doctrinal framework for how Army sustainment supports unified land operations.

⁸⁴*ADP 3-07, Stability*, August 2012; *ADRP 4-0, Sustainment*, July 2012; *ALM 69-6932-HB*, *CGSC ST 101-6*; *FM 10-1, Tactics, Techniques, and Procedures for Fire Support for the Combined Arms Commander*; *FM 3-06, Urban Operations*; *FM 55-30* (Superseded with *ATP 4-11*) *Army Motor Transport Units and Operations*; *FMI 4-90.1 Brigade Support Battalion*; and *FMI 4-93.2, The Sustainment Brigade*.

⁸⁵Class descriptions were provided by the Captain Career Course Training Department located at the Ft. Lee, VA., 12 August 2013, the classes are not reflected on the current POI.

The support operations course is taught at Fort Lee, VA, and installations that request an onsite class, at the Professional Education Center, North Little Rock, AR, and as an elective at the Command and General Staff College (CGSC), Fort Leavenworth, KS.⁸⁶ The course is divided into two phases, the first is Phase I, an on-line course that is intended to provide the officer with the basic concepts required to complete Phase II, the second as the on-site class that teaches Phase II. The same two questions that apply to CLC3 apply to the SPO course as well; are the sustainers set up to understand that the elements of sustainment are meant to ensure operational success by providing for operational reach, freedom of action and endurance?⁸⁷ Or does the curriculum set the students up to be experts that can merely drive the sustainment system to efficiency? In assessment of the curriculum the SPO course provides great tools and skills for the sustainer. However it establishes a framework that generates an over reliance on computed estimates and an under reliance on considerations that effect operational reach. The scope of the SPO course at CGSC is to;

Prepare CGSC majors to serve as support operations officers or in other key and developmental positions in tactical units. It also facilitates critical analysis of doctrinal tactical logistic support concepts and functions and the detailed integration of multifunctional logistics planning within brigade combat team (BCT), support brigade, and theater sustainment brigade operations.⁸⁸

This course educates the sustainment officers who will serve as key support operation officers, sustainment planners, and executors in the Brigade Combat Team (BCT), Sustainment Brigade, Aviation Support Brigade and other sustainment assignments as required.

⁸⁶The Command and General Staff College is authorized by Fort Lee to instruct and certify students in the Support Operations Curriculum. This elective is mandatory for all sustainment officers that have not taken the Support Operations course before, or for those who have not completed their key and developmental assignment.

⁸⁷*ADP 4-0, Sustainment*, iii, 3.

⁸⁸U.S. Army Command and General Staff College, Advance Book, *Support Operations* (Phase II), (Fort Leavenworth, KS: Defense Automated Printing Service, 2013), 3.

The course is structured as a 48-hour elective across 10 lessons culminating in a concept of support briefing. The lessons cover; Support Operations Overview, Supply and Field Services, Maintenance Operations, Logistics Automation and Standard Army Management Information Systems, Ammunition Operations, Transportation Operations, Bulk Petroleum Operations, Medical Operations, Support Brigade Sustainment Operations, and Sustainment Concepts During Military Decision Making. The goal of the course as described in the Support Operations Advanced book is to;

Provide Logistics Corps majors with a baseline of information, expertise, and skills in preparation for assignment to a multifunctional support battalion support operations position. The course addresses sustainment operations at the brigade level and above; however, the emphasis for the course is at the BCT level of operations. Secondary to this, the course serves as a professional development course for all Logistics Corps officers.⁸⁹

Upon analysis of the curriculum it is fair to say that, yes, logistics majors are provided a baseline of information, expertise, and skills, but they are not provided with how the information, expertise, and skills nest with doctrine to ensure operational reach, freedom of action, and prolonged endurance. For example, the TLO as described in the Support Operations Course elective at CGSC is to “plan and analyze sustainment support operations.”⁹⁰ The standards required to demonstrate the planning and analysis include thirteen considerations listed below;

Support relationships established at the brigade, division, and echelon above division levels of operation; Ammunition support on the battlefield—determine critical shortfalls in sustaining Class V; POL operations; Maintenance operations on the battlefield, to include maintenance techniques in support of tactical operations; Integration of logistics STAMIS to include the use of SAMS-E, SAAS-MOD, and SARSS with emphasis on analyzing reports to improve readiness; Managing the ASL, its purpose, and understanding the key players in supply management; Transportation support requirements, assessing transportation capabilities, and understanding transportation employment considerations to support combat operations; Planning considerations for aerial delivery operations and the advantages and disadvantages of different methods of aerial delivery; Supply and field service support operations in

⁸⁹Ibid.

⁹⁰Ibid.

tactical operations; Requirements and planning considerations for Army health services support (HSS), and force health protection (FHP) during combat operations; Organization, responsibilities, capabilities, and employment of the sustainment brigade as it supports sustainment operations on the modular battlefield; Support operations for the modular support brigades; and, Integrated logistical operations at the brigade level and above.⁹¹

Of note, in these thirteen considerations there is not one mention of providing operational reach, freedom of action, and prolonging endurance. Upon further review of the advanced sheets listed in the *Support Operations* (Phase II), Advance Book (Fort Leavenworth, KS: Command and General Staff College, March 2013), there is no reading requirement of *ADRP 4-0* or *ADP 4-0* in support of the ten classes or ELOs. Although the TLO enables the students with appropriate tools to complete estimates, contribute to the decision making process, and know a little bit about each of the capabilities within a support operations shop and sustainment commands, it is not nested with the sustainment doctrine, *ADRP 4-0*.

Of the ten ELOs, the most relevant lesson that pertains to preventing culmination and extending operational reach is lesson ten, Support Operations Overview and Sustainment Concepts during Military Decision Making Process (MDMP). In this lesson the students produce a written logistic estimate, mission analysis briefing, and a concept of support. The students must demonstrate an analysis that includes; formulation of sustainment function requirements, task analysis of supported unit's mission, requirement analysis of capabilities, shortfalls, and additional support requirements, synchronization of support with tactical operations, support matrix preparations, and contingency logistic operations. During this lesson the student receives useful instruction and repetitions associated with MDMP. However the analysis is weighted more

⁹¹Ibid.

towards requirements, tasks, and shortfalls with only marginal consideration to operational reach.⁹²

Although the information in the lesson, Support Operations Overview and Sustainment Concepts during Military Decision Making Process (MDMP) is relevant and applicable there is little to be said about the considerations of operational reach. In the student text there are several examples in which operational reach is mentioned in such a way that would support the holistic application of sustainment planning, however it falls short of the mark. For example, on page 1-2 the student text does line up with *ADP/ADRP 4-0*, it reflects the principles of sustainment, and states that the sustainment war fighting function is “related tasks and systems which provide support and services to ensure freedom of action, extend operational reach, and prolong endurance.”⁹³ However, it then goes on to establish a pattern that reduces sustainment considerations into “bulletized” listings that ultimately get funneled into sustainment estimates. Thus, a reductionist approach ensues that result in a mathematical output as the sustainment focus of MDMP.

Additionally, another example of this method exists on page 1-7 regards offensive operations. Despite going in depth into anticipation and requirements it only allocates a short section to offensive momentum in which the sustainment priority “must be to maintain momentum of the attack.”⁹⁴ The paragraph continues by addressing sustainment in exploitation and pursuit. The text states that the sustainment plan must be flexible enough to support both exploitation and pursuit. Additionally the same paragraph provides an exhaustive list of twenty-

⁹²Ibid.; Gabriella M. Pasek, “The Top 10 Lessons I Relearned as a Sustainment Brigade Planner,” *Army Logistician* 39 (September-October 2007): 42-44; John Nawoichyk, “MDMP: One Tool in the Commander’s Tool Chest,” *Army Logistician* 40 (September-October 2008): 18-19. *Theater Sustainment Battle Book*, ST4-2 (ST 101-6) (Fort Leavenworth, KS: Defense Automated Printing Service, June 2012).

⁹³*Support Operations* (Phase II) Advance Book, 1-4.

⁹⁴Ibid.

three considerations of techniques ranging from actions such as EPW ops, prioritization of maintenance, anticipation of extended LOCs, to the consideration of increased fuel requirements. However, not once was the “maintain momentum of the attack,” exploitation, and pursuit tied to operational reach and culmination.⁹⁵ Furthermore, no consideration is mentioned about an operational pause or the multiple variables that must be considered to maintain operational reach during exploitation and pursuit in accordance with *ADP/ADRP 4-0*. General Eisenhower and the Supreme Headquarters Allied Expeditionary Forces also considered similar elements to the current check list associated with the attack.⁹⁶ The headquarters prioritized maintenance, increased fuel requirements, considered detainee operations, and extension of LOCs all while concerned about the momentum of the attack, pursuit, and exploitation. However the sustainment plan was executed without the necessary consideration of decisions points associated with operational reach and culmination. As a result, Allied forces lasted approximately thirty-days during the month of August 1944, and then culminated in September 1944.

In total, operational reach is mentioned several times throughout the student text but it is not tied specifically to planning considerations. Reach is mentioned in the principles of sustainment and once in the requirements of the estimate sketch nestled deep in the sustainment planning section of the student text.⁹⁷ Furthermore, consideration of a culmination point is mentioned as one bullet while discussing the concept of support brief. However, it approaches culmination from a purely logistical point of view. By assessing it from a single perspective the trap arises again for a non-holistic mathematical assessment to emerge instead of a decision point for assessment. For example the culmination point will be tied to where you run out of fuel

⁹⁵Ibid.

⁹⁶Ibid., 1-7.

⁹⁷Ibid., 4-16.

according to calculated days of supply without the added analysis of when or who you should pause and for how long in consideration of your fuel resources.⁹⁸

CONCLUSION

By reviewing US Army doctrine, sustainment curriculum, as well as analyzing historical examples, two critical points emerged. First, there is a gap between sustainment curriculum and sustainment doctrine. This gap creates an overreliance on data and science that unintentionally marginalizes the consideration of operational reach. Second, sustainment curriculum is well suited at producing leaders and experts but it does not enable sustainers to plan more holistically in consideration of operational reach, culmination, exploitation, and campaign transition.

By focusing on the idea of sustaining operational reach as the foundation of sustainment planning in both the SPO and CLC3 courses sustainment leaders will be able to better anticipate culmination points and contribute to producing options for command decisions. Both the SPO and CLC3 courses develop sustainers well versed in the sustainment functions that can directly contribute to the MDMP process. However, both courses are fixated on functions and MDMP process causing the students to become product and output oriented instead of oriented towards operational reach.

CLC3 is divided into two phases, the common core which covers unified land operations to prepare company grade officers for command and the logistics phase that produces experts in each of the sustainment functions. At the conclusion of the course the students are prepared to execute command activities associated with ULO and specific sustainment functions. However, the course fails to enable the students to artfully develop their sustainment skill as it relates to operational reach as described in *ADP/ADRP 4-0*.⁹⁹

⁹⁸Ibid., 3-7.

⁹⁹ADP 4-0, *Sustainment*, iii, 3; ADP 3-0, *Operations*, 14.

The lesson plan fails to enable a working knowledge of how sustainment nests with ULO in conjunction with *ADP/ADRP 4-0*. The opportunities to ensure that future sustainment leaders can apply the elements of sustainment holistically to identify potential decision points for the commander associated with operational reach is overlooked. The Support Operations course also faces similar problems.

The SPO course phase I is an on-line course that provides the officer with the basic concepts required to complete Phase II. Phase II is the on-site class that teaches students how to plan and analyze sustainment support operations while being able to expertly manage their sustainment functions. In assessment of the curriculum, the SPO course provides tools and skills for the sustainer, however it establishes a framework that generates an over reliance on computed estimates and an under reliance on considerations that effect operational reach. In the capstone exercise the students develop and brief a concept of support. This brief is predicated on a thorough MDMP and sustainment assessment of the operational enviornment. However, the brief is generated as an output from MDMP instead of as an iterative process in consideration of operational reach.¹⁰⁰

The aperture in which sustainers contribute to the concept of the operations must be broadened beyond estimates and math. Instead of focusing on five days of supply of fuel and three days of ammo during movement from tactical assembly area 1 to objective 1, the focus should be on helping the commander visualize when in time, space, and purpose logistics will impact the operation. By doing this potential decision points relative to operational reach will come to light.

¹⁰⁰*Support Operations* (Phase II) Advance Book, POI, and lesson plans provided by the Command and General Staff College, Support Operations proponent.

RECOMMENDATION

Fortunately, there is opportunity in both the CLC3 and SPO course to incorporate the holistic assessment of operational reach into their planning scenarios and certain POIs. In the CLC3 course, Sustainment Overview POI, key components of sustainment are highlighted in relation to anticipated operational realities. The structure of this framework provides an opportunity for the sustainer to exercise a holistic approach when generating and applying logistic estimates to the concept of support and MDMP process. This POI presents an opportunity to focus on the sustainment functions in relation to operational reach as described in *ADP 4-0*. By grounding this POI with the consideration of operational reach, CLC3 sustainment curriculum will be brought more in line with sustainment doctrine at little cost. The Support Operations Course offers a very similar opportunity.

The course is structured as a 48-hour elective across 10 lessons culminating in a concept of support briefing. The lessons cover multiple lessons ranging from Support Operations Overview, Supply and Field Services, Maintenance Operations, health and services, to Logistics Automation, and Sustainment Concepts During Military Decision Making. Although each lesson is important the Support Operations Overview and Sustainment Concepts during Military Decision Making offer the best opportunity to nest curriculum with doctrine.

The information in Support Operations Overview and Sustainment Concepts during Military Decision Making Process (MDMP) is relevant and applicable but there is little mention about the considerations of operational reach. In the student text and readings associated with the two classes there are several examples in which operational reach is mentioned in such a way that would support the holistic application of sustainment planning, however it falls short of the mark. At some points the curriculum nests with *ADP/ADRP 4-0* and describes the purpose of the

sustainment war fighting.¹⁰¹ However, instead of elaborating on operational reach the POI slips into a discussion of check lists of associated sustainment considerations. These checklists naturally funnel the student into sustainment estimates thus preventing the holistic consideration of the sustainment system and operational reach.

A simple adjustment to this POI can take advantage of the opportunity to focus the student on ADP/ADRP 4-0 and further develop the consideration of the sustainment system as it relates to operational reach instead of its outputs. By rooting the curriculum in the principles of sustainment, aligning it more deliberately with *ADP/ADRP 4-0* and its consideration of operational reach, more depth will be added to the sustainment education process. This depth will enable a balance between doctrine and curriculum that will produce sustainment planners who can balance the art and science of logistics to truly contribute to the decision making process.

¹⁰¹ *ADP 4-0, Sustainment*, 1, describes the sustainment warfighting function as a system that provides support and services to ensure freedom of action, extend operational reach, and prolong endurance.

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